

• REMARKS

Claims 11 and 31 have been objected to due to informalities. The informality in claim 11 cited by the Examiner in the Final Office Action was corrected in the Response to the prior Office Action that was filed on January 12, 2007. Additionally, claim 31 does not contain the phrase “wherein the alkali metal component is a alkali”. The Applicants believe that the Examiner is actually referring to claim 32. Claim 32 was also amended to correct this informality in the Response filed on January 12, 2007. The Applicants respectfully request that the objections to claims 11 and 31 be withdrawn.

The Specification has been objected for failing to provide the proper antecedent basis for the claimed subject matter. Claim 1 has been rejected under 35 U.S.C. §112, first paragraph, for failure to provide a written description of the invention. Claims 13-33 have also been rejected under 35 U.S.C. §112, first paragraph, for failure to provide a written description of the invention.

The Examiner’s rejections are respectfully traversed.

As the specification discloses, many different types of emulsifiers, lubricity boosters, fungicides, pressure agent/anti-rust agents, coupling agents and alkali components, may be used to make the metalworking fluid. There is a working example in the specification which discloses to one skilled in the art how to make the claimed invention. There is no requirement that one needs to include an excessive number of examples to show every combination of every component disclosed in the claims, as this would be an undue hardship on the part of the Applicants. One skilled in the art, reading the application would understand the invention and how to make the metalworking fluid disclosed there in. The remaining claims further disclose

the invention including the ranges of each product disclosed therein. Thus, the Applicants' believe that the objection to the Specification, the rejection of claim 1 and the rejection of claims 13-33 should be withdrawn. However, as requested by the Examiner, the Applicants' have now included a new independent claim incorporating the requested limitations, however, the Applicants' still do not agree that the claims must be amended with this limiting restriction.

In the subject application there is no need for undue experimentation by one trying to make the claimed invention, as examples of each component are given in the application. Additionally, there is no requirement that an example covers every combination of proposed components, as this would be unfair and overburdensome to the inventors. If an application is directed to a material having five or six different components and each of those components has been described as five or six different items, it is not necessary to show examples for each and every one of those combinations. One skilled in the art has an understanding of previous metalworking fluids, and can practice the invention.

Upon reading the specification and the additional claims, the amounts and types of each of the components have been further disclosed and explained. Again one does not need to show every combination with every particular amount of every component as this would be overburdensome to the Applicants. One skilled in the art without undue experimentation would be able to follow and practice the invention as disclosed and claimed by the applicant. Thus, the Applicant's request that the Examiner's objection to the specification and the rejection of claims 1 and 13-33 under 35 U.S.C. §112, first paragraph, be withdrawn.

Claims 1-12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Anantaneni, U.S. Patent No. 6,630,430, in view of Boffa, U.S. Patent No. 5,804,537, Tanaka, U.S. Patent No. 6,245,725 B1, Camenzind, U.S. Patent No. 7,026,438 B2, Van

Dam, U.S. Patent No. 6,784,142 B2, Matsushita, U.S. Patent No. 5,741,763, Zoch, U.S. Patent No. 3,902,868, and Otaki, U.S. Patent No. 4,765,917.

The Examiner's rejection is respectfully traversed.

The present invention as now claimed discloses a metalworking fluid made from heavy alkylate comprising, a residual fraction having C22 - C26 carbon atom of detergent class Alkyl Benzene in the concentration range of 50 to 90 weight percent of the metal working fluid, at least one emulsifier in the range of 10 to 40 weight percent of the metalworking fluid, at least one lubricity booster component in the concentration range of 2-10 percent of metal working fluid, an antioxidant component is in the concentration range of 50-500 ppm, a fungicide component in the concentration range of 50-500 ppm, an extreme pressure additive component in the concentration range of 50-500 ppm, an antirust component in the concentration range of 50-500 ppm, a co-surfactant component in the range of 1-10 weight percent of metal working fluid, a coupling agent in the range of 0.5 to 10 weight percent of metal working fluid, and an alkali component in the range of 8-10 weight percent of metal working fluid.

Additionally, the present invention is directed to a metalworking fluid whereas the cited documents refer to lubricants only. The effects achieved by metalworking fluids and lubricating oils are altogether different. Metalworking operations involve the generation of heat due to friction between the tool and the pieces and due to energy lost deforming the material. This heat needs to be carried away otherwise it creates "white spots". The properties that are sought after in a good cutting fluids are the ability to keep the workpiece at a stable temperature alongwith better surface wettability, surface cooling, emulsifying, detergency, anti-rusting and anti-microbial properties. Lubrication is only one aspect of the metalworking

fluids. However lubricating oils referred in the cited documents do not require such specialized features.

Heavy alkylate, a waste by-product from alkylating industries, was used in present application. It does not contain dodecyl benzene and lower alkylates or condensed rings alkylate and have carbon atom 22-26, i.e. mono ring aromatic with di, tri or higher substitution, which minimize the toxicity of the metalworking fluid. Heavy alkylate is a new feed stock for metalworking fluid and thus not obvious from the prior art. Till today no one thought about utilizing heavy alkylate for metalworking fluid and thus it is an inventive step in the present application and claims 13-33 of present application is a part of that invention.

On the other hand the present invention provides benzene alky derivatives, which are free of toxic and hazardous properties. The compounds/derivatives of the present invention are free from poly-aromatic or olefinic compounds, which are highly hazardous compounds. The present invention provides alkyl benzene from which the above-mentioned compounds have been removed. None of the cited prior arts have developed such compositions wherein the benzene alkyl derivatives are free to the toxic ingredients. Thus, there is no motivation in the prior art references for the inventors to arrive at the present invention.

Moreover the performance of an additive differs in different base compounds, a different application, a different condition of application, and different additive combination and dosage. The selection of an appropriate additive and its dose level to achieve the desired performance of a formulation is not obvious from any of the cited prior document.

Anantaneni, U.S. Patent No. 6,630,430 is directed to a process for the production of 2-phenyl alkyl benzene and sulfonate which is useful as a detergent and may be employed as an

additive including motor oil, cutting fluid, emulsion and motor fuels. The patent is not related or similar to the present claim of a composition of a metalworking fluid (soluble cutting oil). Anantaneni'430 is related to detergent additives, whereas the present invention is related to a metalworking fluid composition where use of sulfonate is one option and is not compulsory. Anantaneni is also directed to the synthesis of various alkyl benzenes. The present invention is not related to this synthesis but to the application (value addition) of heavy alkyl benzene (a waste fraction) from detergent class alkyl ate (LAB) production unit.

Boffa, U.S. Patent No. 5,804,537 is directed to an engine oil composition using Ca, Mg, Na over based sulfonate of TBN 2 to 12. The patent is not related or similar to the present claim of a metalworking fluid (soluble cutting oil) composition. Boffa'537 is related to detergent additives, whereas the present invention is related to a Metalworking fluid composition where the use of a sulfonate is one option and is not compulsory.

Tanaka, U.S. Patent No. 6,245,725 is directed to the application of sulfurized oxymolybdanum dithiocarbonate as an oil soluble additive for extended life lubricants. The '725 patent is not related or similar to the present composition claim of a 'metalworking fluid (soluble cutting oil)'. In Tanaka'725, sulfurized oxymolybdanum dithiocarbonate is used as an additive. In the present invention Phospho-sulfurized pentadecyl phenol molybdenum salt was used. Tanaka is also directed to lube additives, whereas the present invention is related to a metalworking fluid composition.

Camenzind, U.S. Patent No. 7,026,438 discloses an automotive lubricant additive which is very different from a soluble cutting oil additive. The additive was 5-tert-butyl-4-hydrauxy-3-methyl (or tert butyl) phenyl substituted carboxylic acid ester with thiodi ethylene glycol and mono hydroxy alcohol reaction product. The antioxidant of soluble cutting oil of the

application is quite different from this compound. It is hindered by alkyl phenol such as 2,6, di tert butyl 4-methyl phenol. The Camenzind'438 is directed to lube anti-oxidant additives, whereas the present invention is related to a metalworking fluid composition, which are both very different compositions and work differently.

Van Dam, U.S. Patent No. 6,784,142 discloses a combination which can be suitable for valve train wear and piston deposit modifiers in a diesel engine, while the present combination is directed to a soluble cutting oil. The additive component of Van Dam is an Ethylene Carbonate treated succinimide or borated succinimide and these are different from the succinimide of the present application, which is dodecyl maleic anhydride succinimide of hexa ethylene penta amine. The use of phenolic antioxidant is also different. Van Dam'142 is related to lube additives, which as previously described are very different from the metalworking fluid composition of the present invention.

Matsushita, U.S. Patent No. 5,741,763 discloses a composition which can be used to lubricate the cutting machine gear and other parts. It claims that this lube will not be miscible in used cutting oil and will separate quickly in a collecting tank. Due to this, used cutting oil will not be contaminated by machine oil (claimed under US Patent 5,741,763) and cutting oil will be easily recycled. The above oil is not for cutting process but for lubricating the machine. Matsushita'763 is directed to machine lube oil (not soluble oil), whereas the present invention is directed to a metalworking fluid composition (soluble cutting oil) which worked differently.

Zoch, U.S. Patent No. 3,902,868 is directed to a mixture of oxygenates (alcohols and ketones) used for better combustion of gasoline in IC engines. This invention is quite different from the Applicants' additive combination. Zoch'868 uses alcohols and ketones as an oxygenates mixture (may solubilized water drop in fuel) to improve the combustion in IC

engines. It is not a metalworking fluid. In the present invention alcohols are used as co-surfactant/co-emulsifier to produce stable oil-water emulsion. Zoch is directed to a fuel additive (Oxygenate mixture for combustion of fuel), whereas the present invention is related to metalworking fluid composition (soluble cutting oil). Additives to improve combustion do not have the same requirements as a metalworking fluid.

Otaki, U.S. Patent No. 4,765,917 is related to a formulation useful for smith-work such as forging/molding of metal where metal is heated to cause plastic to be in a soft state and then pressed in a die. The water solution which is used is applied on the die to prevent metal sticking in die. It has no specification or may be near to Bureau of Indian Standard (BIS) 9009. It is very different from machining (drilling, cutting, sawing, milling, turning, grinding) and the needed soluble cutting oil formulation, which is as per specification of BIS 1115/1986. Forging/molding is different from machining. In forging shapes, the metal is heated and pressed, so starch/cellulose/rosin like materials were used in the water solution to prevent metal sticking with the die. Machine shaping the metal by cutting, grinding, drilling, etc and oil, water and additives were used as a coolant, a lubricant and an anti-rust component. The Otaki'917 reference is related to forging additive, whereas the present invention is related to Metalworking fluid composition (soluble cutting oil).

The Examiner has cited eight different references, each one being cited for teaching the use of one component. There is no teaching or disclosure to combine the teachings and components nor is there any suggestion that such a combination would work. A *prima facie* case of obviousness exists when the prior art provides motivation to make the claimed invention, and there must be some suggestion to do so. A retrospective view of inherency cannot serve as a substitute for actual teaching. There is no teaching or suggestion that the

components can be used together to provide an improved metalworking fluid. Thus, the Applicants' request that the Examiner withdraw the 35 U.S.C. §103(a) rejection.

As a review, the Applicants' invention is directed to using waste petrochemicals, including commercial heavy alkyl benzene fractions in a metalworking fluid, i.e. soluble cutting oil. This compound has previously not been used as such an application. Sodium oleate is used in the metalworking fluid composition to enhance the non-toxicity and biodegradability. A new type of additive synergistic combination is used in metalworking fluid formulation and the performance is at par with BIS 1115/1986. Thus, there is additional value added to the alkylate (LAB) manufacturer. The eight references cited by the Examiner are not for metalworking fluid (soluble cutting oil) formulation. Thus, there is no reason why the Applicants without undue experimentation would know to take a piece of each of these eight patents and combine them for a product which is significantly different than that disclosed in each of the references.

In view of the foregoing, the Applicants contend that the amended claims and the claims dependent there from are in proper form. Applicants also respectfully contend that the teachings of Anantaneni'430, in view of Boffa'537, Tanaka'725, Camenzind'438, Van Dam'142, Matsushita'763, Zoch'868, and Otaki'917 do not establish a *prima facie* case of obviousness under 35 U.S.C. §103(a). Thus, claims 1-34 are considered to be patently distinguishable over the prior art of record and should be allowed.

The application is now considered to be in condition for allowance, and an early indication of same is earnestly solicited.

The Commissioner is authorized to charge Deposit Order Account No. 19-0079 for any fees that may be required.

Respectfully submitted,



Arlene J. Powers
Registration No. 35,985
Gauthier & Connors, LLP
225 Franklin Street, Suite 3300
Boston, Massachusetts 02110
Telephone: (617) 426-9180
Extension 110